

## Metaphors and Categories

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**Abstract** Despite the obvious affinity between the study of metaphor and the study of categorization, the link between these two fields of research has received little attention in cognitive psychology or in other disciplines. The purpose of the present study is precisely to establish and develop that link between those two research fields. After outlining the main recent developments in the modern study of categorization, focusing on the introduction of *ad hoc categories*, six major observations made in recent studies of metaphor comprehension (concerning, for example, the distinction between metaphors and non-metaphors, the asymmetry of metaphors, interpretation preference in metaphors, and the aptness of metaphors) are introduced. The main argument holds that these observations can be accounted for in a parsimonious and coherent way by assuming that metaphor comprehension is, in fact, a process of (ad hoc) category formation. The final section relates this proposal to alternative theories.

### Introduction

Recent years have witnessed rapid developments in two fields of research: the study of categorization and the study of metaphor. A major outcome of the study of categorization has been a shift away from the classical "Aristotelian" view of categorization and toward what has become known as the "prototype" view (see Lakoff's [1987] monumental book on the topic). More recent developments in this field, however, have extended the types of categories previously studied (i.e., common, or stable, categories) to *ad hoc categories*, a notion which is central to the theory of metaphor outlined in this paper.

The study of metaphor, meanwhile, has also been developing rapidly. Its main outcome has been the realization that metaphor is not merely a phenomenon belonging solely to the domain of poetic language, nor even a linguistic phenomenon per se, but rather, a much broader conceptual process which should be examined within a far broader interdisciplinary perspective. This broadening of scope, and especially the attempts to study the actual psychological processes involved in metaphor comprehension, mainly within cognitive psychology (see, e.g., Ortony 1979; Gentner 1983) have resulted in the emergence of new and interesting observations on metaphor structure and comprehension.

Despite the obvious affinity of these two fields of research, the link between them has received little attention in cognitive psychology<sup>1</sup> or in other disciplines (I will elaborate on one interesting exception in section 3). The purpose of this paper is precisely to establish more firmly that link between those two fields of research: metaphor and categorization. More specifically, I intend to propose that metaphor comprehension is, in fact, a process of (ad hoc) category formation, as characterized by most recent studies of categorization. I will argue that this proposal provides a unified framework which can account for the aforementioned major observations regarding metaphor structure and comprehension made in recent studies of metaphor.

I will begin by outlining the main recent developments in the modern study of categorization, focusing on the introduction of ad hoc categories (section 1). In section 2, I will introduce six major observations made in recent studies of metaphor comprehension (concerning, e.g., the distinction between metaphors and non-metaphors, the asymmetry of metaphors, interpretation preference in metaphors, and the aptness of metaphors). The main thrust of my argument will be that these observations can be accounted for within a coherent and unified framework by assuming that metaphor interpretation is, in fact, a process of (ad hoc) category formation. In the final section, I will conclude by comparing this proposal to two related alternatives.

### 1. The Modern View of Categorization and the Notion of Ad Hoc Categories

The main thrust of the modern approach to categorization has been the rejection of the classical Aristotelian assumptions regarding categorization and the shift toward an alternative conception of categorization, which has generally become known as "the prototype view."

1. As R. Honeck, C. Kibler, and M. J. Firment (1987: 103) comment, "There have been few attempts in experimental psychology to link figurative language with categorization."

Typically associated with the rejection of the classical tenets of criterial conditions which determine category membership, the "prototype view" also rejects tenets concerning the internal structure of categories, category boundaries, and so forth (for a thorough survey and discussion of this shift from a classical to a modern view of categorization, including its philosophical, psychological, and linguistic aspects, see Lakoff [1987]; Smith and Medin [1980 *inter alia*]).

Typically, however, this shift pertains primarily to the kind of theory of categorization endorsed rather than to the *types of categories* addressed. As a rule, both classical and modern studies of categorization have centered mainly on *common* categories, such as various natural kinds (e.g., "bird," "fruit") or artificial categories (e.g., "vehicle," "clothing"). By contrast, more recent studies of categorization have expanded the types of categories addressed by focusing on less common and, psychologically, less stable categories, namely, ad hoc categories (see Barsalou 1983). Ad hoc categories are to be distinguished from two other types: common categories and "random" categories (or collections). In what follows, then, I shall outline the characterization of ad hoc categories by comparing them with the two other category types.

#### *Ad Hoc versus Common Categories*

*The differences between ad hoc and common categories: The issue of conceptual (in)stability.* Categorization is a way of partitioning the "world" into groups of objects called "categories." Clearly, there is a considerably large number of ways in which it is possible to categorize any given object, that is, to group it with other objects (see, e.g., Barsalou 1983; Murphy and Medin 1985; Rips 1989 *inter alia*). Thus, "apple" could be categorized as "fruit," together with "orange," "pear," and so on, or as "red things," together with "fire," "blood," and so forth. Nevertheless, these possible categorizations appear to differ in terms of their degree of stability in memory so that some are more stable than others. Thus, for example, out of context, "apple" would be categorized as "a kind of fruit" rather than as "a red entity," "car" as "a kind of vehicle" rather than as "a thing with an engine," and so on. The former categorizations represent stable categories, while the latter represent ad hoc categories. Traditional studies of categorization (as well as the majority of modern ones) have typically focused only on common (i.e., stable) categories, such as "fruit" and "vehicle," ignoring less stable categories (see Murphy and Medin 1985 for a more detailed discussion).

More recently, however, the study of categorization has been extended to include less stable, that is, "ad hoc" categories (see, e.g., Barsalou 1983). Typically, ad hoc categories are constructed in order to achieve certain purposes. Suppose, for example, that one wishes to find the connection between "electric wires" and "spaghetti" (in an

attempt to interpret, say, the metaphorical comparison "electric wires are like spaghetti"). Bearing this in mind, one must come up with a superordinate category of which both electric wires and spaghetti are members. Obviously, there is no such "common," or stable, category (the terms "common" and "stable" will be used interchangeably throughout this paper) under which both concepts are stored in memory. One must therefore construct in a post hoc manner, rather than retrieve from memory, a (relatively) new ad hoc category for both *A* (electric wires) and *B* (spaghetti). A reasonable candidate in this case might be the (ad hoc) category "having tangled and flexible strands," within whose domain both *A* and *B* can be included.

Ad hoc categories differ from common categories in certain respects, but are similar to them in others (see Barsalou 1983). Let me first discuss the differences between these two category types. Ad hoc categories (e.g., "things having tangled strands") differ from "stable" categories (e.g., "vehicles," "birds," or "countries") in that they lack the "conceptual stability" which is typically associated with the latter. This lack of conceptual stability in memory can easily be tested experimentally by asking subjects to point out the name of a superordinate category when presented with a stimulus which is supposedly one of its members. For a stimulus such as "spaghetti," the answer is far more likely to be "food" than "having tangled and flexible strands." Accordingly, "spaghetti" is more likely to be stored in memory as a member of the stable category "food" than as a member of the category "having tangled and flexible strands." Still, in a specific context and for a specific purpose (e.g., for the purpose of interpreting the metaphor above), the reader can and must construct such an ad hoc category rather than merely retrieve a preexisting one from memory.

*The similarities between ad hoc and common categories: Prototype structure in ad hoc and common categories.* While the differences between ad hoc and common categories may not sound too surprising, the interesting observation made in recent studies of categorization (see, e.g., Barsalou 1983) is that these two category types bear certain similarities to each other, the most important of which is their *prototype structure*. Since this is an important characteristic of both stable and unstable (ad hoc) categories, let us elaborate a little here. Perhaps the most salient characteristic of the modern study of (common) categorization has been the notion of prototype structure. The classical (Aristotelian) view traditionally held that no logical (or psychological) priority is given to certain members of a category over others. By contrast, modern studies have shown that categories are structured according to *prototypes*, with certain members being more prominent, or prototypical, than others. This characterization has been repeatedly substantiated

by the findings obtained in various psychological, as well as linguistic, tests (see, e.g., Rosch 1975; Lakoff 1987).

Moreover, one of the most important implications of this prototype structure is that it exhibits a basic (psychological) asymmetry: the less prototypical category member is conceived of as closer (i.e., more similar) to the more prototypical member than vice versa. For example, A. Tversky and I. Gati (1978) argue, on the basis of a series of well-known studies of similarity judgments, that the comparison "Poland is like Russia" is preferred (as making more sense, showing greater similarity, and so on) over the inverse comparison, "Russia is like Poland." Note that Russia is a more prototypical member than Poland of the category "Communist countries," and it is precisely this difference in prototypicality that is responsible for the asymmetry. Similar results in the domain of perceptual, rather than conceptual, categories (e.g., colors, lines, and so on) may be found in a study by E. Rosch (1975). She found that nonvertical and nonhorizontal lines are conceived of as psychologically closer to vertical and horizontal lines, respectively, than the other way around; she also found that the same asymmetry holds between nonfocal and focal colors.

Taken together, then, these results suggest that a basic asymmetry obtains between members of categories: less prototypical members are conceptually closer to (i.e., more similar to) prototypical members than vice versa. This prototype structure and the conceptual asymmetry associated with it have been mainly studied in the domain of stable (common) categories. However, more recent studies (notably, Barsalou's 1983 seminal study; see also Murphy and Medin 1985; Glucksberg and Keysar 1990) have shown that this prototype structure can also be found in ad hoc categories. For example, it was shown (Barsalou 1983) that within the ad hoc category of "things to take on a camping trip," the item "a case or box for foodstuffs" is likely to be considered more prototypical than, say, "a computer" (even though it is conceivable that a true workaholic might always wish to take a computer).

*Categories as theories.* Another important characteristic of both ad hoc and common categories (as pointed out in Murphy and Medin 1985; Medin and Wattenmaker 1987) is their being "semi-theories" of the concepts involved. This recently emerging characterization of categories as (semi) theories (see, e.g., Murphy and Medin 1985) requires some elaboration.

The foregoing discussion clearly raises the question of what makes a given category coherent, that is, what makes the set of entities comprised by a given category a coherent set. As the discussion of ad hoc categories has demonstrated, there is a considerably large number

of ways of categorizing any given object, that is, of grouping it with other objects; thus, "volcano" could be categorized as "a mountain," together with other types of mountains, or as "things which erupt unexpectedly," together with "rage," and so forth. Nevertheless, each (common) object is usually categorized under one common category. Thus, "volcano" is typically categorized as "a mountain," "apple" as "a fruit" (rather than, say, "red things"), and so on. This clearly raises the question of category coherence: What is the basis of the preference for certain groupings over others? The main proposal set forth by most studies of categorization so far (both the classical and the modern "prototype" paradigm) has emphasized the role of "similarity" of features as the basis for categorization. The idea has been that members of a given category are similar to each other in that they share "similar" features or correlated sets of features. For example, a high correlation obtains between the properties comprised by the members of the category "furniture": thus, members of that category share such sets of correlated properties as function, substance (typically wood), location (typically indoors), and so on; since this correlation of properties is not shared by members of other categories, this cluster provides the basis for grouping "pieces of furniture" into a category. However, recent studies of categorization (see Murphy and Medin 1985; Medin and Wattenmaker 1987; Lakoff 1987; and Keil 1989 *inter alia*) have provided compelling arguments against this "similarity-based" approach, demonstrating its inadequacy in accounting for a large number of categorization data cases. As a brief illustration, consider the concept of "toy train," which is, arguably, categorized as a "toy" rather than a "kind of train" despite its being more similar to other trains than to other toys. Thus, in an informal experiment that I conducted, five informants were asked, first, to decide whether "toy train" belonged to the category "toys" or to the category "trains," then to judge the similarity of a toy train to other toys and to other trains. Typically, their judgments supported the argument against the "similarity-based" approach to categorization in that a "toy train," while being judged as more similar to other trains than to other toys, was nevertheless categorized as a "toy" rather than a "kind of train."

The alternative view of categorization, initially proposed by G. L. Murphy and D. L. Medin (1985), has been the "theory-based" approach, according to which the categorization assumes a (folk) theory on the part of the person who is engaged in that particular cognitive process. This theory "guides" him in selecting the relevant features and the relevant feature correlations; in other words, noticing features and feature correlations is not an "objective" process based on similarity, but is instead theory-dependent. Thus, D. Medin and W. Wattenmaker (1987), following S. L. Armstrong, L. R. Gleitman,

and H. Gleitman (1983), note that most concepts are not simply the sum of independent properties, but rather, are based on some theory-like underlying principles which emphasize the causal (and other) relations holding between these properties. For example, all of the properties characteristic of a bird (e.g., "ability to fly," "having feathers," "having wings," and so on) do not make it a bird—unless these properties occur together in a "bird structure": "This bird structure certainly consists of a large set of relational properties and not simply attributes" (Medin and Wattenmaker 1987: 31). Thus, in order for a given entity to be considered a "bird," it is necessary for it, in addition to having these properties, to show the same causal (and other) relations needed to hold these properties together. To take a trivial example, there must be a connection between a bird's having wings and its ability to fly, a causal relation which does not exist in the case of a "toy bird" that has wings and has the ability to fly. Or take the example of the category "car," whose members belong to that category not just because they share certain features or correlated sets of features. Rather,

a theory of why cars exist, what they are used for, and how subtypes are designed for specific environments, tells me why there are typical feature correlations uniquely associated with car subtypes, such as sports cars, sedans, and off-road vehicles. Thus, I have a coherent cluster of causal beliefs about why the features of low ground clearance, wide wheelbase, powerful high-rpm engine, and two seats frequently occur in sports cars, and why features such as high ground clearance, short wheelbase, four-wheel drive, and roll bars co-occur with off-road vehicles. Within any of these subclasses, I have few if any theoretical or causal beliefs that I use to interpret correlations. Yet, I daily use these correlations to distinguish, for example, a Ford from a Chevy sedan. Theory may tell me to look at correlations between trim and hood shape and ignore the license plate, the color, and the presence of fuzzy dice. (Keil 1989: 23)

(For a thorough discussion of this theory-based approach to categorization, see Murphy and Medin [1985]; Medin and Wattenmaker [1987 *inter alia*].)

Now, this characterization of category cohesiveness applies to both common and ad hoc categories. In fact, one of the advantages of this new view of categorization is that it is flexible enough to account for both category types (see Murphy and Medin 1985; Medin and Wattenmaker 1987 *inter alia*). Thus, Medin and Wattenmaker (1987) state that

for our present purposes it will prove convenient to work with a very informal definition of conceptual coherence. We use the term to describe groupings of entities that "make sense" to the observer as might be reflected in various measures such as ease of learning or even direct ratings of coherence. Coherence is not to be confused with the notion of naturalness as

used by Keil . . . or natural kinds as used by others because very unnatural concepts may also prove to be coherent in circumstances where the members of the category are coordinated through some theoretical frameworks. For example, consider the category comprised of the following objects: children, jewelry, portable television sets, photograph albums, manuscripts, oil paintings. Out of context such a category may not make much sense, but it becomes coherent in the context *things to take out of one's home during a fire*. Barsalou . . . has shown that these goal-derived categories behave very much like standard lexical concepts. Certainly these "ad hoc" categories are not "natural" by Keil's . . . criteria, but they do seem to hang together in their own context. (Ibid.: 32)

In sum, then, the main point made by this newly emerging "theory-based" approach to categorization is that categorization is based on a complex process which not only takes into account the parts of an object and certain perceptual attributes (e.g., color, shape, and so on), but in fact focuses primarily on the causal and explanatory *relations* obtaining between these parts and attributes. This characterization of the basis of categorization lies at the basis of the account I am about to propose for the observations regarding metaphor aptness and preferences in metaphor readings (to be discussed in detail in section 2).

#### *Ad Hoc Categories and "Random" Collections*

Up until this point we have compared ad hoc categories with common ones. The next question to be addressed is, naturally, whether any collection of entities which does not constitute a common category is necessarily an ad hoc category. Barsalou's (1983) study shows that this is not the case: ad hoc categories are not just random collections of entities, but rather, are internally structured categories. This is a crucial point which has not been sufficiently emphasized by subsequent studies of the topic (e.g., Murphy and Medin 1985; Glucksberg and Keysar 1990; Keysar and Glucksberg [this volume]). Thus, Barsalou distinguished between ad hoc categories and "random" collections, the latter representing an arbitrary and noncoherent set of entities, by using a labeling task. He asked his subjects to provide labels for sets of items which consisted of either a common (stable) category (e.g., "fruit") or an ad hoc category or ("as best as possible," as the author states) no category (e.g., "grease," "spider," "admiral," and "copper"). The results clearly indicated that ad hoc categories differ from "random" collections. Thus, subjects generated labels for the common categories 100 percent of the time. For the ad hoc categories, they did so 97 percent of the time with contexts, and 83 percent of the time without. For the random categories, they generated labels 14 percent of the time with contexts, and 31 percent of the time without (see Barsalou 1983).

In sum, then, ad hoc categories differ from both common categories

and "random" collections of objects. They share with common categories the prototype structure, but they lack the conceptual stability of common categories. Moreover, despite the fact that ad hoc categories are relatively less stable, they nevertheless reveal a closer "instance to category" relatedness than do "random" categories, as shown by Barsalou's labeling task. Thus, when subjects are presented with a set of objects and asked to label them, they typically have no difficulty generating such a label, and their judgment typically tends to converge compared to random categories.<sup>2</sup>

#### *Summary*

Before proceeding to show how these characterizations of categories can account for the main observations made about metaphor comprehension, let us briefly summarize the major characteristics of ad hoc categories, based on the observations above. These characteristics will be highly relevant to the account of the observations regarding metaphor to be proposed in section 2.

1. Ad hoc categories differ from their counterparts, common categories and "random" collections of entities. They differ from common categories in that they lack the "conceptual stability" typically associated with that type. Hence, they must be *constructed* for specific goals (e.g., metaphor interpretation, as I will argue below) rather than *retrieved* from memory. Ad hoc categories differ from mere "random" collections in that they constitute a "coherent" set, possessing various characteristics which distinguish them from such collections.

2. The following characteristics of ad hoc categories are also shared by common categories:

2. The distinction between ad hoc categories and the other two types should, of course, be viewed as representing a continuum rather than a polar distinction: such categories as "vehicles," "furniture," and "countries" represent relatively stable ones, whereas categories like "things to take on a camping trip" or "things to take away from a burning house" appear to represent relatively unstable categories. In between are such cases as "white entities" or "cold entities," which are presumably less stable than "furniture" but more stable than "things to take away from a burning house." Although the theoretical basis for this continuum is still pending investigation, certain tendencies clearly play a role in determining the stability of a category. For example, a high degree of correlation among the properties comprised by a certain category contributes to the stability of that category: members of the category "furniture" clearly share a large number of correlated properties, such as function, substance (typically wood), location (typically indoors), and so on. Among categories whose members share only one property (e.g., "white entities," "cold entities," etc.), those categories which are based on perceptual properties (e.g., "white entities," "cold entities") tend to be more stable than categories based on a functional property. Obviously, these are only tendencies and thus require further careful examination.

— They exhibit a clear *prototype structure* (one implication of which is asymmetry).

— Members of ad hoc categories are assigned a label (i.e., are organized as a category) with relative ease, even without an explicit context. In this respect, ad hoc categories are highly similar to common categories and highly dissimilar to “random” collections (this observation follows directly from the labeling task performed by Barsalou’s subjects).

— *Relations*, particularly *causal relations*, rather than “similarity” per se, play a crucial role in the categorization process of both category types.

## 2. Metaphor Comprehension as a Process of (Ad Hoc) Category Formation

Having presented the characteristics of ad hoc categories, based on recent studies of categorization, we can now introduce the main proposal of this paper. But, first, a word on terminology: the terms “metaphor” and “metaphorical comparison” will be used interchangeably throughout the following discussion to refer to expressions of the form “A is B” or “A is like B,” where “A” and “B” stand for nominal expressions (see Ortony 1979a *inter alia*). Returning to the main point, I wish to propose here that a whole range of observations concerning metaphor structure and comprehension (to be presented below) can be accounted for by assuming that, *in interpreting a metaphorical comparison, an ad hoc category is constructed so that the two metaphorical terms are conceived of as its members*. Typically, this ad hoc category is constructed such that the second metaphorical term (but not necessarily the first one) represents a prototypical member of that category (see Glucksberg and Keysar [1990] and Shen [1989] for more specific arguments supporting the claim that a metaphor’s second term is a prototypical member of an ad hoc category constructed during the process of metaphor interpretation). It is my argument that this assumption represents a coherent framework within which we can account for the following set of observations as well as other, less major ones concerning metaphor structure and comprehension. Let me emphasize that although each of the observations above has been accounted for within a specific theory, there has never been any attempt to integrate them into a coherent, unified framework, as is proposed here.

### *The Literal/Metaphorical/Anomalous Distinction*

The first major observation made by recent studies of metaphor is that there are three different and psychologically distinct types of comparisons, namely, literal, metaphorical, and anomalous comparisons. Consider the following three cases, which illustrate these three types:

Billboards are like placards. (1A)

Billboards are like warts. (1B)

Billboards are like pears. (1C)

Clearly, (1A) is a literal comparison, while (1B) is metaphorical, and (1C) anomalous (see, e.g., Ortony 1979a; Ortony, Vondruska, Foss, and Jones 1985). N. Goldblum (1990) provides some empirical support for the psychological reality of this distinction. According to Andrew Ortony (1979a), the difference between the first two cases and the third one concerns the ease with which they are interpreted. Thus, both literal and metaphorical comparisons, such as those in (1A) and (1B), lend themselves more readily to being interpreted than does (1C). This is the main motivation for considering (1B) a metaphorical comparison and (1C) an anomalous one.<sup>3</sup> Adopting the triadic (graded) distinction among common, ad hoc, and “random” categories (see the first characteristic of ad hoc categories), the main proposal to be made in this section is that this triadic (graded) distinction corresponds to the triadic (graded) distinction among literal, metaphorical, and anomalous comparisons, respectively. In other words, my proposal is that, in interpreting literal, metaphorical, and anomalous comparisons, the comprehender is assumed to activate or construct common, ad hoc, and “random” categories, respectively.

There are, in fact, three claims being made here: first, that in interpreting a literal comparison, the comprehender activates the common category of the comparison’s two terms; second, that the interpretation of metaphorical comparisons is based on the construction of an ad hoc (that is, neither common nor “random”) category; and third, that the terms comprised by anomalous comparisons typically represent random collections of concepts, rather than common or even ad hoc categories. At present, the evidence for these three claims is only rudimentary and tentative, but it nevertheless suggests a promising direction for future research.

The first claim has been tentatively suggested by various authors (see, e.g., Kittay 1987), although they lacked the appropriate conceptual apparatus described above (i.e., the distinction between ad hoc and common categories). In order to provide some support for this claim, I reanalyzed the results obtained in the experiments conducted by Ortony et al. (1985). Ortony’s subjects divided a large set of comparisons, such as those in (1), into three groups—literal, metaphorical, and anomalous. (Typical examples of literal comparisons were “cigarettes are like cigars,” “museums are like galleries,” and “billboards

3. The identification of a comparison as metaphorical or anomalous is based on the subjects’ judgments presented in Ortony et al. (1985).

are like placards"; typical examples of metaphorical comparisons were "rage is like a volcano" and "questions are like crow bars.") For each comparison, Ortony and colleagues then constructed a ground, which was judged as adequate by his subjects.<sup>4</sup>

My hypothesis was that the grounds of the literal comparisons would represent the common category to which the comparisons' two terms belonged. In order to examine this hypothesis, twelve (adult) subjects were presented with a set of thirteen literal comparisons (the grounds were not included). They were then asked to provide a definition for each term and to indicate to which domain (or category) it belonged. The assumption was that both a definition of a concept and a direct domain (category) label should reflect the category to which a concept belonged. Thus, for example, if the subject were asked to define the concept "anger," his definition, together with the domain to which "anger" belonged, would contain the (superordinate category) term "feeling."

The subjects' responses were then compared to the grounds taken from Ortony and colleagues' experiments. A match was considered to be any case in which a term's definition and/or the domain for a term overlapped in their semantic content with the ground proposed by Ortony et al. (In order to test the reliability of my judgments as to the presence or absence of a match, I presented a sample of ten terms to another judge, who performed the same task. The agreement rate between the other judge's determinations and my own was around 90 percent, with most of the disagreements resolved through discussion.) The results strongly supported my claim: 89.7 percent of the twenty-six terms examined showed the match above. These results strongly support the claim that interpreting a literal comparison involves the activation of the common category to which the comparison's two terms belong.

My second claim was that, in interpreting metaphorical comparisons, the comprehender constructs ad hoc categories. In order to confirm this claim, one has to show that the metaphorical ground represents neither a common category for both terms nor a random one. Let us discuss each claim in turn. The fact that the grounds of metaphorical comparisons do not represent "random" categories is reflected by two related findings: (1) the overall agreement among Ortony and colleagues' subjects as to the adequacy of the grounds for

4. For example, the subjects were presented with a similarity statement, such as "faith is like glue," and its ground, "producing a strong and permanent bond," and were then asked to rate, on a scale of one to four, the degree to which that ground could be considered adequate for that similarity statement (1 = least adequate, 4 = most adequate). Each ground which was rated above 2.5 was considered adequate.

the metaphorical comparisons, and (2) Ortony's (1979a) observation concerning the ease of interpretation of metaphorical comparisons. These two findings are fully compatible with Barsalou's (1983) results, especially the observation that when asked to label a collection of random items, Barsalou's subjects typically found it very difficult to come up with such a label (unlike their experience with a list of ad hoc category members); in those very few cases for which they did come up with some solution, there was very little agreement among them, again unlike the case of ad hoc categories. From this we may conclude that the category constructed in the interpretation of a metaphorical comparison is not a random one.<sup>5</sup>

On the other hand, it is also clear that the category constructed in these cases is not a common category of the two metaphorical terms. The subjects' responses in the experiment I conducted shows that, regardless of whether the metaphorical ground represents a salient or a nonsalient property of the two metaphorical terms (a question which is of the utmost importance to Ortony's proposal), this property does not typically represent the common superordinate property of either term in the metaphorical comparison. Consider, for example, the property "erupt unexpectedly and violently," which was judged the ground for the metaphor "rage is like a volcano." Now, this is regarded as a salient property of "volcano," less so of "rage"; note, however, that even in the case of "volcano," this property does not represent its common category (presumably, "mountains"), let alone in the case of "rage."

The correlation between anomalous comparisons and "random" categories has not been examined along similar lines. However, some indirect evidence supporting this correlation has been reported by B. Fraser (1979). He collected interpretive responses to a set of sentences (e.g., "she is an octopus" or "he is a termite") which were delib-

5. Incidentally, there is some developmental evidence which also supports the idea that literal and metaphorical comparisons are more basic (and natural) ways of organizing the comparisons' two terms. Thus, S. Vosniadou and A. Ortony (1983) found that when children (aged 3 and 6) were asked to complete sentences and were given a choice between literal similarity (i.e., among members of the same semantic categories, as in *a river is like a lake*), non-literal similarity (i.e., among members of different semantic categories which constitute, in my terms, an ad hoc category, as in *a river is like a snake*), and anomaly (i.e., cases with no discernible similarity across different semantic categories, as in *a river is like a cat*), the following pattern emerged: the three-year-old children preferred the meaningful similes to the anomalies, but they did not exhibit any preference for the literal over the non-literal ones. This data shows that children, by the age of three, in whom categorical organization is still undeveloped (see, e.g., Keil 1989), are sensitive to the difference between coherent organizations, namely, organizations that "make sense" in some way (i.e., the organization into common or ad hoc categories), and those that are "arbitrary," namely, random collections of entities.

erately constructed as anomalous sentences. Fraser's main finding was a lack of consistency among the interpretations made by his subjects. Thus, for example, his subjects' interpretations for "he is a termite" ranged from "he is a pest, is destructive, eats a lot, eats a little, is little, tears at your sense of self, bores into any conversation," and so forth to "he is deceptive, picks things apart, is a parasite, is always worrying about you," and so on.

To conclude, then, this initial evidence supports the claim that the triadic distinction among common, ad hoc, and random categories corresponds to the triadic (graded) distinction among literal, metaphorical, and anomalous comparisons, respectively.

#### *Asymmetry in Metaphors*

The second major observation to be accounted for pertains to the asymmetry exhibited by metaphorical comparisons. It has been observed (notably, by Ortony [1979b] and by Ortony et al. [1985]) that metaphorical comparisons exhibit a high degree of asymmetry: when put in reverse order, metaphorical comparisons become anomalous, that is, comparisons to which it is relatively difficult to assign an interpretation. Consider:

Billboards are like warts. (2A)

Warts are like billboards. (2B)

As can be noted, reversing the order of the metaphorical comparison in (2A) yields an "anomalous" comparison (2B).

This observation, which holds for a large set of metaphorical comparisons (although not all of them, as argued in Shen [1989]), can be easily accounted for within the framework I am proposing here, according to which, in interpreting a metaphor, the comprehender constructs an ad hoc category of which the second term represents a prototypical member. Recall that the second characteristic of (ad hoc) categories assumed a basic asymmetry between category members: the order in which less prototypical members are compared to more prototypical ones is preferred (i.e., is easier to comprehend) over its reverse. Thus, in our case, if the category constructed in both orders is, say, the ad hoc category "things which are ugly and stick out," it is evident that "warts" are better examples of that category than "billboards." Hence, so the argument goes, comparing "billboards" to "warts" is preferable to comparing "warts" to "billboards."

In fact, more compelling evidence for the present proposal was introduced in Shen (1989), where I discussed the case of metaphorical comparisons which do not exhibit any asymmetry. A typical case in point is "snow is like flour." The reversed order ("flour is like snow") shows asymmetry neither with regard to ease of interpreta-

tion (both orders are easy to understand) nor in their meaning (both share roughly the same meaning); therefore, such comparisons should be considered asymmetrical, according to Ortony's criteria. Now, the interesting point about these examples is that in both cases their members represent prototypical members of the ad hoc category, which, according to the present proposal, is constructed during the comprehension of the comparison. Thus, in the case of both "snow is like flour" and its reverse, "flour is like snow," the ad hoc category which, arguably, is constructed is "white entities," in which both members, "snow" and "flour," are prototypical members. Since that is the case for the comparison in both orders, there is, according to this account, no asymmetry, as this occurs only in cases where the comparison's second term represents a prototypical member, but the first term does not. In sum, then, both asymmetry and symmetry in metaphorical comparisons can be accounted for by assuming that an ad hoc category is constructed during the interpretation of these comparisons.

#### *Preferences in Metaphor Interpretation*

A third major observation has been made by D. Gentner (1983), according to whom relational, particularly causal-relational, properties are more likely than non-relational ones to become the basis of metaphors' interpretations (see, e.g., Gentner 1983; Lakoff 1987; Shen 1991 inter alia, for detailed discussions on the topic; see also Gentner 1983; Smith and Medin 1980; Medin and Wattenmaker 1987, for some justifications of the use of the terms "relational" and "non-relational" properties or their semantic equivalents). Consider, for example, the following analogical comparison:<sup>6</sup>

The atom is like the solar system.

According to Gentner's (detailed) analysis, the knowledge structure of the solar system consists of non-relational properties, such as the sun's color ("yellow"), as well as such relational properties as "more massive than" (a relation holding between the sun and the planets, i.e., the sun is more massive than the planets). Of special importance is the higher-order *causal* relation which connects the fact that the sun is more massive than the planets and the fact that the planets revolve around the sun. Generalizing from a large set of analogical comparisons, Gentner proposes that, in interpreting such comparisons, subjects exhibit a preference for interpretations based on (higher-order) causal relations over those based on lower-order relations (such as the relation of being "more massive than" holding between the sun and

6. The differences between analogies and metaphors are not directly relevant to Gentner's (1983) findings.



the planets); interpretations based on lower-order relations were, in turn, preferred over those based on non-relational properties. Thus, in interpreting the comparison above, subjects were more inclined to conceive of the similarity between the comparison's two terms as consisting of the causal relation rather than the other, lower-order relations, which, in turn, outranked non-relational properties.

Moreover, I have observed (Shen [submitted]) that the number of (semi)causal connections holding between properties of a given concept plays a central role in metaphor-reading preferences. Consider, for example, the case of the interpretation of such a comparison as "Tom is like a tortoise." Clearly, "Tom is slow" is a more likely reading of that comparison than, say, "Tom's (face?) color is brown or green." I have argued that the reason for this interpretive preference is that the property "slowness" has a relatively high number of (semi)causal connections to other properties of our "tortoise" concept, while the property of color has none. Thus, the "slowness" of the tortoise is connected via causal relations to such properties as its having a shell (which makes it harder to move faster), its clumsy shape, its short legs, and so on. On the other hand, its color is not causally connected to any of the other properties ascribed to tortoises. (Various types of data are presented in Shen [submitted] that confirm this observation in a large number of metaphorical comparisons.)

These aforementioned observations can be accounted for within my proposed framework by considering the fourth characteristic of ad hoc categories, which emphasized that relations, particularly causal relations, constituted the basis for coherent categories. The account put forward here, then, is that the preference given to relations (and in particular semi-causal relations) as well as to highly connected properties (such as the tortoise's slowness) in metaphorical readings derives from the fact that these types of properties constitute a better basis for creating a coherent (ad hoc) category than other, non-relational properties. Thus, these observations fit the assumption that the interpretation provided for a metaphor constitutes an ad hoc category.

#### *Aptness of Metaphors*

A related observation has to do with metaphor aptness, to which this same account (in terms of the role played by relations in creating category cohesiveness) applies as well. A robust observation made by Gentner and Clement (1988) is that relational metaphors (i.e., those whose interpretation is based on relational properties) are judged better (more apt) metaphors than attributive metaphors (i.e., those whose interpretation is based on non-relational properties). A (typical) case in point is illustrated by the following examples:

Cigarettes are like pacifiers. (3A)

The sun is like an orange. (3B)

Clearly, a relational metaphor is expressed in (3A) since its interpretation has to do with a relational property (e.g., "providing oral satisfaction and soothing," which, according to Gentner and Clement's notation, is a relation between two arguments in the relevant domain: pacifiers and their users); in contrast, an attributive metaphor is expressed in (3B) since its interpretation involves non-relational properties, namely, "the color orange" and/or "round."

Gentner and Clement provide some robust findings to support their claim that, in a wide variety of cases, relational metaphors are judged to be better than attributive metaphors. This preference can clearly be adequately accounted for within the present proposal in a similar way to the account proposed for the former observation (regarding reading preferences in metaphors). Thus, so the account goes, in judging the aptness of a given metaphor, the comprehender would consider a better metaphor to be one for which a (more) coherent category could be constructed; and, since relations constitute a better basis for category coherence than non-relational properties, the comprehender would judge the relational metaphor to be a better one than the attributive one.

#### *Extraction vs. Construction*

The fifth observation to be accounted for is related to the process through which the metaphorical "ground" is constructed. Although it has been traditionally held by some students of metaphor that the property which serves as the metaphorical ground preexists in the semantic representation of the concepts being compared in the metaphor, what has recently become widely believed is that comprehending metaphors is not based on extracting (or abstracting) *already existing* properties (as is assumed by most traditional views of metaphor), but rather, on the construction of correspondences between the metaphor's two terms (see, e.g., Tourangeau and Sternberg 1982). Consider, for example, the case of "rage is like a volcano," where the supposed "reading" for this metaphor (at least according to Ortony's findings) is something like "erupting unexpectedly and violently." In this case, so goes the argument, "erupting violently and unexpectedly" is not a (literal) property of the concept "rage," so, by implication, it cannot be simply "abstracted" or extracted via some cognitive process. Therefore, it is argued, the shared property cannot be said to function as the category dominating the two terms. Now, this observation poses a serious problem for any model which assumes a feature-matching process of interpretation, such as various recent psychological as well

as other models (see, e.g., Ortony's [1979a] discussion of the topic). By contrast, this observation is fully compatible with, and even nicely accounted for, by my proposal in general and by the very distinction between common and ad hoc categories in particular. (Note that this distinction presupposes the possibility of *constructing* ad hoc categories in an ad hoc manner for particular purposes, such as metaphor comprehension, without presupposing its preexistent storage in memory.) Thus, my proposal adequately accounts for the ad hoc nature of metaphor interpretation.

#### *Effectiveness in Prompting Recall*

Another important finding in the study of metaphor has been the effectiveness of the metaphorical "ground" in prompting recall. In one important study (Verbrugge and McCarrell 1977), the authors found that the "grounds" were more effective in prompting subjects' recall of sentences containing the original vehicle than of sentences containing the original topic. These findings clearly suggest that the vehicle (the metaphor's second term) is more closely related to the metaphorical ground than is the topic, the metaphor's first term (see also Kogan and Connor 1980: 287–88).

This observation, too, can be accounted for by my proposal since the metaphorical comparisons used by Verbrugge and McCarrell all contained vehicles that were prototypical members of those categories represented by the grounds (in fact, in the very same study, these authors argue that, on the basis of circumstantial evidence derived from various psychological tasks, vehicles are more likely than topics to be exemplary instances of their grounds). Clearly, this finding can be accounted for by assuming that the metaphorical ground represents an ad hoc category. In one of Barsalou's (1983) experiments, his subjects were presented with labels for ad hoc categories and were asked to list, for each of them, the first four members of that category that came to mind. The main finding was that prototypical members are typically activated first, while non-prototypical ones are usually not activated at all. According to the present proposal, then, the fact that the metaphorical "grounds," namely, the ad hoc category constructed, activated the metaphorical vehicle (i.e., the more prototypical member) rather than the topic (i.e., the less prototypical member) is directly accounted for by the above-mentioned characteristic of the relationship between ad hoc categories and their prototypical and non-prototypical members.

### 3. Alternative Approaches to Metaphor

Let me conclude this presentation of my proposal by briefly comparing it with two other, seemingly related proposals: the traditional "abstrac-

tion" view, and the more recent theory of "metaphor as a category statement."

#### *The Standard Abstraction View*

Superficially, the present proposal might seem to be quite similar to the traditional "abstraction" view of metaphor, the origins of which can be traced back to Aristotle's *Poetics*, as noted by Tourangeau and Sternberg (1982). According to this view, metaphors are conceived of as (implicit) comparisons of terms that belong to a common class or category. Such a view assumes that the metaphorical "ground" represents a feature (or set of features) shared by both terms of the metaphor, which has to be "abstracted" from these terms throughout the interpretation of the metaphorical comparison. This "shared property" is viewed as representing the category of which both terms are members. This view is basically shared by a vast body of studies of metaphor (a detailed discussion of its underlying assumptions has been provided by Tourangeau and Sternberg [1982]). Several different versions of this view can also be found in the literature (see, e.g., Chomsky 1964; Malgady and Johnson 1980; and Van Dijk 1975). Since there are so many versions of the "abstraction" view, I will not attempt in the limited space available here to present a detailed comparison between my proposal and those various versions, but it is important to point out that the present proposal differs from most versions of the "abstraction" view in its conception of the key notion, *category*.

Traditionally, most proponents of the "abstraction" view have held (implicitly or explicitly) that the property shared by the metaphor's two terms defines a *set*, that is, a category, in its straightforward classical sense (see Lakoff 1987), whose members include the comparison's two terms. Such a simple notion for which a category is simply a set is incapable of accommodating most observations discussed in this paper. Let me illustrate this inadequacy by briefly reviewing three of these observations, the first of which concerned distinguishing among literal, metaphorical, and anomalous comparisons. If the abstraction view were to be elaborated to account for this distinction, it would presumably do so by distinguishing between different types of "shared properties" or, in other words, between different types of "sets," with each type corresponding to one of the three different types of comparisons. However, to the best of my knowledge, no such principled distinction has been proposed so far by proponents of the abstraction view, leaving us with no way of accounting for the literal/metaphorical/anomalous distinction via the abstraction view.

The observation regarding the preference for relational properties, and in particular causal relations, over non-relational properties is a

second observation which is unaccounted for within the abstraction-view framework. If one assumes that the interpretation of a metaphor would simply require the extraction of some shared property (as is assumed by proponents of the abstraction view), then any property will do as well as any other, thus leaving us unable to account for the aforementioned preference for relational properties over non-relational ones. Even if a version of the abstraction view were to be developed so as to include the necessary distinction (i.e., between relational and non-relational properties), it would still be faced with the problem of *explaining* why relational, particularly causal-relational, properties were preferred over non-relational ones. The third observation which poses serious difficulties for the abstraction view is the one that concerns aptness in metaphors. Since the argument presented above also holds for this observation, I shall not elaborate further on it.

In sum, then, there are major differences between the notion of *category* proposed in this paper (summarized in section 1) and the simple notion of *set*, which is equivalent to the notion of "a shared property." These differences enable the present proposal to account for various observations regarding metaphor comprehension that remain unaccounted for within the traditional abstraction view in most, if not all, of its versions.

#### *The Theory of Metaphor as a Category Statement*

A proposal far more pertinent to the present one has recently been developed by S. Glucksberg and B. Keysar (1990; see also Keysar and Glucksberg [this volume]). They propose that metaphors of the form "A is B" (e.g., "my job is a jail") are (implicit) category statements basically similar to a literal category statement, such as "a robin is a bird." A category statement of the form "A is B" is a statement in which *A* and *B* belong to different category levels: the *B* term represents a superordinate category (hence a more general level) of the concept represented in *A*. Glucksberg and Keysar assume that terms of concepts can sometimes stand for (i.e., mean) not only the standard concepts to which they refer, but also a superordinate ad hoc category of which the former is a prototypical example. For instance, the term "jail" can stand for both "public prison for detention of persons" (its standard lexical meaning) and "unpleasant place"; note that the latter represents an ad hoc superordinate category of which the former is a prototypical example. Thus, Glucksberg and Keysar argue that such metaphors as "my job is a jail" should be read as "my job is an unpleasant place," that is, as category statements. However, the difference between metaphors (which are implicit category statements) and explicit category statements is that the categories activated in the former are ad hoc categories, while common (stable) categories are activated

in the latter. Thus, like my own proposal, Glucksberg and Keysar's is based on the very notion of ad hoc categories.

Their proposal differs from mine, however, in several respects. Perhaps the main difference is that my proposal does not assume a metaphor of the form "A is B" to be a category statement but, rather, a comparison between two concepts belonging to the same category level. However, this difference is not a crucial one, since Glucksberg and Keysar's main proposal is, like mine, that in interpreting metaphors the reader constructs an ad hoc category of which the metaphor's second term represents a prototypical member (due to lack of space I will not pursue this point, which, I believe, is quite obvious).

The present proposal should be viewed as an attempt to take the same general route proposed by Glucksberg and Keysar further, developing their notion of ad hoc categories such that it can accommodate several additional phenomena in metaphor comprehension which they do not fully address. For instance, my proposal develops at least two main aspects of this notion which their theory fails to articulate: (1) the distinction between ad hoc and "random" categories, and (2) the view of ad hoc categories as (folk or semi-) theories. Recall that these two characterizations of ad hoc categories were the basis upon which several observations about metaphor, such as the distinction between metaphorical and anomalous comparisons, the preference for relational properties over attributes in metaphor interpretation, and the preference for relational metaphors over non-relational ones, could be accounted for. In order to account for these major observations, it should be augmented by the former characterizations (above) of the ad hoc category which, at present, are lacking in their proposal.

#### Summary and Conclusion

The main thrust of the present paper has been to incorporate the notion of ad hoc categories, as developed in recent studies of categorization, into the study of metaphor by proposing that metaphor comprehension is based on a process of category formation. Such an assumption, I have argued, would enable us to account for several major observations regarding metaphor comprehension. The proposal that the same mechanism underlies both metaphor comprehension and the process of categorization would, of course, still need to be thoroughly explored in order to be fully substantiated. Some of this proposal's implications have been discussed in Glucksberg and Keysar's new theory of metaphor, to which the present proposal is closely related. In addition, there have been some initial indications supporting that direction of research. For example, Honeck, Kibler, and Firment (1987), on the basis of previous studies and as part of their "conceptual base view of categorization" (see also Honeck, Yoegtle, Dorfmaier, and Hoff-

man 1980; Honeck, Sugar, and Kibler 1982), have suggested that the interpretation of the abstract meaning underlying proverbs is based on a process similar to that of category formation, where the label for that category is the proverb itself. Thus, different stories associated with a certain proverb are viewed as members of the category labeled by that proverb. These studies show that such categories behave much like common categories, that is, they are internally structured in a prototype-like structure and so on. Moreover, C. Kibler (1984) has even characterized the proverb category as a type of figurative category organized around miniature theories concerning the relationships obtaining between proverb elements, which is similar to the characterization of categories endorsed by my own proposal.

Another relevant study is that of T. Sticht (1979), who found some evidence drawn from the educational literature for a close relationship between the development of the ability to categorize and the ability to analogize, suggesting that these are based on very similar mechanisms, even from a developmental point of view. Yet another set of studies has suggested the same linkage in the course of addressing such linguistic phenomena as polysemy and semantic change. According to these proposals (e.g., Lakoff 1987), the various senses of polysemous lexical items, as well as those senses that underwent diachronic change during the development of a given language, constitute natural categories, which exhibit prototype structure and so on. The important point here is that metaphorical extension is a major mechanism for incorporating new senses (i.e., new members) into those cases, thus suggesting another perspective on the linkage between these two domains.

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## How Metaphor Makes Its Wonders

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Metaphor is both important and odd—its importance odd and its oddity important. Nelson Goodman

The purpose of this paper is to examine what Donald Davidson (1984 [1978]) calls the "usual view of metaphor" together with the radical alternative which he proposes. The central idea of the "usual view" is that metaphor has a sense or meaning which differs from its literal meaning and that metaphor says true or false things about the world, although its message might be more exotic, profound, or concealed than that of plain prose. This idea, as Davidson says, "is found in the works of literary critics like Richards, Empson and Winters; philosophers from Aristotle to Max Black; psychologists from Freud and earlier to Skinner and later; and linguists from Plato to Uriel Weinreich and George Lakoff" (ibid.: 246).

It is this central idea which Davidson considers to be "the central mistake." Referring to Max Black, Paul Henle, Monroe Beardsley, Nelson Goodman, and others, Davidson emphasizes that he doesn't disagree with their accounts of what metaphor *accomplishes*. His disagreement pertains, rather, to "how metaphor makes its wonders" (ibid.: 247), or to what metaphors actually *say* or *mean*. On the "usual" (semantic) account, whatever is accomplished is brought off by the metaphorical meaning or, more generally, by the cognitive content of the metaphor. Davidson categorically denies this, concluding that metaphors, strictly speaking, mean *nothing*, that there is no cognitive

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